Giving Everyone the Health of the Educated: An Examination of Whether Social Change Would Save More Lives Than Medical Advances

| Steven H. Woolf, MD, MPH, Robert E. Johnson, PhD, Robert L. Phillips, Jr, MD, MSPH, and Maike Philipsen, PhD

The past century's progress in medicine and public health has reduced morbidity and lengthened life expectancy, but the pace of progress has been modest. For more than 100 years, the national death rate has declined at a rate that has remained remarkably constant (1% per year), with the exception of the conspicuous spike during the 1917–1918 influenza pandemic (Figure 1). Neither the public health advances of the early 20th century nor the medical technological advances in more recent times have done much to change the modest downward slope.

In the past few decades there have been heavy investments in technological advances. Both industry and government have spent billions of dollars per year on the development of new drugs and devices. The failure of these efforts to enhance the rate of decline in mortality rates, however, raises questions about the prudence of carrying this investment priority into the new century. A potentially more effective alternative might be to continue technological advancements but to invest more substantively in areas outside of medical innovation that can do more to avert deaths and enhance health.

We demonstrated in a previous analysis that equity of mortality rates among African Americans and Whites would have resulted in 5 times as many lives being saved during 1991 through 2000 as those saved by medical advances.[1] Minority groups have higher mortality rates for multiple reasons, notably adverse social conditions such as inadequate access to health care, educational disparities, and poverty.[2–4] People of low socioeconomic status have higher mortality rates and poorer health status than does the general population.[5,6] Addressing these social determinants of health might do more to save lives than the incremental advancements in the technology

Objectives. Social determinants of health, such as inadequate education, contribute greatly to mortality rates. We examined whether correcting the social conditions that account for excess deaths among individuals with inadequate education might save more lives than medical advances (e.g., new drugs and devices).

Methods. Using US vital statistics data for 1996 through 2002, we applied indirect standardization techniques to estimate the maximum number of averted deaths attributable to medical advances and the number of deaths that would have been averted if mortality rates among adults with lesser education had been the same as those among college-educated adults.

Results. Medical advances averted a maximum of 178 193 deaths during the study period. Correcting disparities in education-associated mortality rates would have saved 1 369 335 lives during the same period, a ratio of 8:1.

Conclusions. Higher mortality rates among individuals with inadequate education reflect a complex causal pathway and the influence of confounding variables. Formidable efforts at social change would be necessary to eliminate disparities, but the changes would save more lives than would society's current heavy investment in medical advances. Spending large sums of money on such advances at the expense of social change may be jeopardizing public health. (*Am J Public Health.* 2007;97:679–683. doi:10.2105/AJPH.2005.084848)

of care that consume the bulk of societal investments in health.[6,7]

We explored this possibility by examining death rates among adults with inadequate education, a group known to have excess mortality rates. Mortality rates among adults with a high school education and those with less than a high school education (inadequate education) are 2.3 and 2.7 times higher, respectively, than rates among those with at least some college education.[8] Education empowers individuals with knowledge to make better personal health choices and with higher earnings to obtain access to quality health care. The link between education and mortality is confounded by its association with other factors that also affect health outcomes (e.g., early life experiences, race and ethnicity, community and environmental conditions).

We used education-associated excess mortality as a proxy for this web of sociological, economic, and biological variables. We recognize that this excess mortality will not be fully

eliminated by education alone but rather by ameliorating the combination of related sociological factors, education among them, that account for the health of the educated. Our aim was to quantify the potential benefit from such an enterprise and to contrast it with the lives saved by our current investment in medical advances.

METHODS

We examined mortality data for 1996 through 2002 reported by the National Center for Health Statistics (NCHS). We compared (1) the maximum number of deaths averted by the downward secular trend in mortality (Figure 1) and (2) the number of deaths that would have been avoided had mortality rates among adults with an inadequate education been the same as those among adults with at least some college education. We excluded the period before 1996 because data on educational attainment were
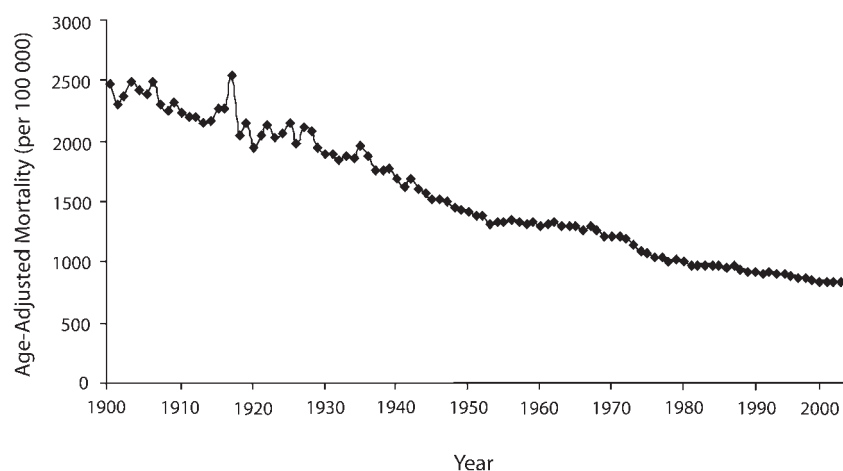
Note. Data were derived from the National Center for Health Statistics; specific database sources are available as an online supplement to this article.

FIGURE 1—Age-adjusted mortality rates in the United States: 1900–2003.

not reported on death certificates until 1989 and were collected in fewer than 45 states before 1996. Data from 2003 and beyond were not available at the time of this study.

Deaths Averted by Medical Advances

Our crude measure of the health benefit of medical advances was the secular year-to-year decline in age-adjusted mortality rates. This decline stems from multiple factors, but to be conservative we gave full credit to medical advances. We reasoned that the number of lives saved by the reduction in mortality rate constituted the maximum number of averted deaths that could be attributed to medical advances.

We calculated averted deaths using indirect standardization of mortality rates to determine expected numbers of deaths (see the online supplement to this article). We multiplied the resident population of the United States by the difference between the crude mortality rate of the calendar year in question and a recalculated mortality rate reflecting no improvement in rates. We derived the latter for each calendar year by multiplying the age-specific population counts by the age-specific mortality rates for the corresponding age groups in the previous year, summing the age-specific deaths, and dividing by the total population. We summed the results for 1996 through 2002 to arrive at the cumulative number of averted deaths.

Deaths Averted by Education-Related Excess in Mortality

We estimated the number of deaths that would have been averted during 1996 through 2002 if mortality rates among adults with an inadequate education aged 18 to 64 years had been the same as rates among adults with 1 or more years of college education. We excluded adults aged 65 years or older because NCHS does not consider educational attainment data for deceased seniors to be valid.[9,10] Children and adolescents were excluded because corresponding mortality rates were unavailable.

We applied indirect standardization of mortality rates (see the online supplement to this article) for 2 populations of adults with inadequate education: (1) adults aged 18 to 64 years with less than 12 years of education and (2) adults aged 18 to 64 years who had completed 12 years of education but less than 1 year of college. The 2 populations of adults with an inadequate education and those with a college education formed a trichotomy, with each corresponding to a different model analyzed according to the recommendations of Backlund et al.[11]

For each population of adults with an inadequate education, we calculated the number of avertable deaths by calendar year and by gender, multiplying the age-specific population of adults with an inadequate education (derived from annual US Census Bureau reports)

by the mortality rate reported by NCHS for college-educated adults in the corresponding age groups. To arrive at a gender-specific mortality rate, we divided the total number of calculated deaths, summed across the age groups, by the population with an inadequate education of that gender. We subtracted this hypothetical crude mortality rate (an approximation of what would have occurred if age-specific death rates among adults with an inadequate education had equaled those among college-educated adults) from the actual crude mortality rate among adults with an inadequate education and multiplied it by the total population with an inadequate education to estimate the number of avertable deaths among adults with an inadequate education for the calendar year in question. We summed the results for 1996 through 2002 to approximate the cumulative number of avertable deaths.

RESULTS

Deaths Averted by Medical Advances

The downward secular trend in age-adjusted mortality rates in the United States saved an average of 25 456 lives per year during 1996 through 2002 (Figure 2). Cumulatively, 178 193 deaths were averted during this 7-year period. As described in the Methods section, this represents the maximum number of averted deaths that can be attributed to medical advances.

Deaths Averted by Correcting Education-Associated Excess Mortality

Each year, an average of 195 619 deaths would have been averted if mortality rates among adults with an inadequate education had been the same as mortality rates among college-educated adults (Figure 2). Cumulatively during 1996 through 2002, 1 369 335 deaths would have been averted, a ratio of 8:1 relative to the number of lives potentially saved by medical advances.

Disparities in education-associated excess mortality were more acute among those with less than a high school education than among those with a high school education (but no college education). Nonetheless, because high school graduates outnumber adults with less than a high school education,[12] a majority of the lives saved by eliminating education-associated
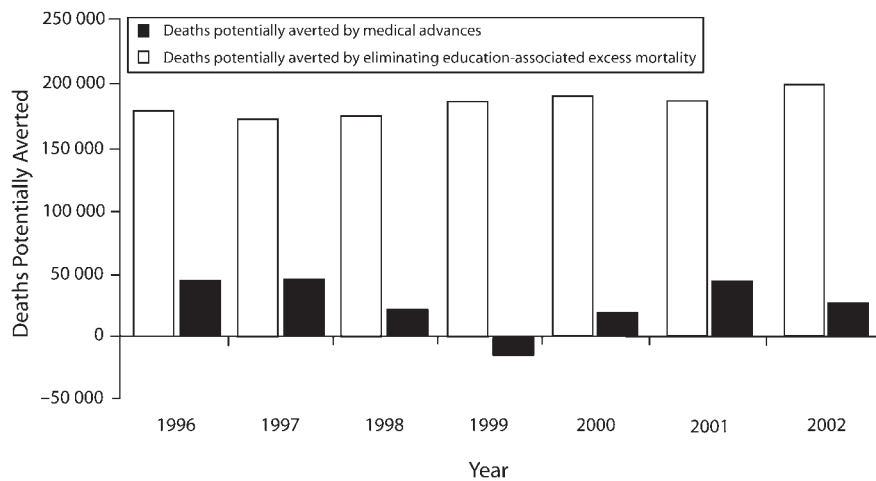
Note. The graph demonstrates that elimination of education-associated excess mortality (white bars) would save considerably more lives than would medical advances (black bars). Cumulatively during 1996–2002, elimination of education-associated excess mortality would avert 1 369 335 deaths, whereas medical advances would avert 178 193 deaths. The estimate of deaths averted by eliminating education-associated excess mortality applies only to adults aged 18–64 years, whereas deaths averted by medical advances include all age groups (see the online supplement to this article for more information).

FIGURE 2—Deaths potentially averted per year in the United States by medical advances and by eliminating education-associated excess mortality: 1996–2002.

excess mortality—870 286 (63.6%) of the 1 369 335 averted deaths—would involve adults with a high school diploma.

DISCUSSION

Education in Context

It makes sense that better education would enhance health outcomes. An educated populace is better positioned to access information and understand the implications of lifestyle (e.g., smoking, physical inactivity) and health care options, to make choices that optimize individual health as well as that of one's children, and to navigate the health care system and manage their illnesses. Educated individuals have better jobs that provide the resources for health insurance coverage, access to care, and out-of-pocket expenses and the means to climb out of social conditions and neighborhoods that compromise health (e.g., poor housing, pollution, crime). Educational attainment also helps the economy by offsetting health care needs and improving earnings.[13–15] The international development community has long focused on education as a strategy to raise a country's health status and wealth.[16,17]

The causal pathway linking education to mortality is complex.[18] Income represents an important confounding variable.[18,19] Lahelma et al.[20] estimated, on the basis of Finnish data, that at least one third of education-related health inequalities are mediated by occupational class and income. Some contend that class and poverty account almost fully for the higher mortality rates associated with limited education[21] and that improved education will not correct social class differences.[22] Conversely, data from Kansas show a conspicuous dose–response relationship in terms of the influence of gaps in education on mortality and self-reported health status independent of income and other variables.[6] Income is both a consequence and a mediator of education, as in the case of affluent applicants having better prospects for college admission.

Influences other than income are also cofactors (mediators) on the causal pathway linking education and mortality.[23] Researchers are only beginning to disentangle the interrelated role of individual characteristics such as social class, risk factors, early life experiences,[24,25] accumulated disadvantage, stress, and shame. Race, ethnicity, and other factors that contribute to health disparities[26] also contribute to gaps in educational attainment. Although individuals with inadequate education are more likely to engage in unhealthy behaviors,[27,28] the literature is divided regarding

how substantively these risk factors contribute to health inequalities.[29–32]

Regardless of their education or income, individuals may experience inferior health because of environmental conditions that a diploma cannot remedy. Neighborhood effects[33,34] and factors associated with the larger social environment[35] contribute to adverse health outcomes independently of one's educational status.[36] Some studies suggest that income inequality and relative deprivation adversely affect health even after adjustment for individual income.[37–41] Others indicate that the association has less to do with income inequality than with race and other confounders or with neomaterial conditions (e.g., underinvestment in social infrastructure) and macrolevel social and economic policies with which income inequality is associated.[42–48]

It seems likely, therefore, that the amelioration of education-associated excess mortality requires more extensive social change than simply ensuring that all adults complete college or even eliminating educational disparities. The latter would certainly improve population health, but at present there is not a sufficient understanding of the complex causal pathway that links education to health outcomes to quantify how much health would be improved. Clearer insight into these interrelationships is necessary to make rational choices on how to correct the problem.

Challenges and Opportunities

Efforts to improve educational attainment face their own formidable challenges. Correcting disparities in funding for education could improve school buildings, teacher–student ratios, and curricular and extracurricular offerings.[49,50] Policy options could also remedy other problems, such as gaps in the degree and quality of preschool experiences and in the quality of teachers and school leadership. Some factors—including school–community relations, early life experiences, parental involvement, home support of education, and opportunities for informal learning—are less amenable to policy solutions. Inadequate consensus regarding the causes and remedies of educational gaps, coupled with budget pressures and political crosswinds, makes it difficult for educators, governing bodies, the private sector, and interest groups to embrace solutions.[51]

These challenges should not dissuade policymakers from tackling the conditions that cause education-associated excess mortality any more than the obstacles to curing cancer have impeded long-standing investments in that endeavor. Decisions about how much to invest in solving health problems should be driven by the degree to which society will benefit. In comparison with the gain from medical advances, we found that 8 times as many deaths would be averted if mortality rates among adults with an inadequate education were the same as those among individuals at higher education levels. This contrast is not drawn to promote 1 enterprise over another but rather to assess how much priority each should receive. On the basis of how many lives can be saved, our data suggest that efforts to correct the social conditions causing education-associated excess mortality should be proportionately greater than society's investment in medical advances. Today's leaders embrace opposite priorities, however.

Indeed, budget pressures from escalating health care costs and medical research have led the government to reduce support for social services, including education, thereby choking off an upstream strategy that could reduce the demand for health care.[52] Medicaid is outpacing education as the largest state budget item,[53] and the federal government has instituted cuts in Head Start and other programs that have strong associations with educational achievement.[54] Striking the proper balance—funding the health sector in ways that safeguard progress toward universal education—may do more to improve the health of the population than concentrated spending on health care.[22,52]

Given that education is more likely to be embraced by the American citizenry than universal health care, resolving educational disparities may represent the most viable option for change among the major social determinants of health. The public appears to have turned away from social welfare and to be more tolerant of income disparities. As noted by Emanuel, "The one issue of social justice that inflames Americans is education. And this is not because it will lead to better health outcomes but to economic advancement."[52(p59)] Education enjoys more support as a universal right and is viewed as a more worthy public investment than other social change initiatives such as the alleviation of poverty or even universal health insurance coverage.

Limitations

There were methodological limitations to our calculations. First, we focused on averted deaths and excluded other dimensions of health such as morbidity. Second, crediting medical advances for the entire decline in mortality rates is overly conservative and ignores other important contributors such as changes in demographics, lifestyle, and environment. The true number of lives saved by medical advances is probably lower than our estimate.

Third, in our calculations we applied the benefits of medical advances to all age groups, but we examined the benefits of correcting education-associated excess mortality only for adults aged 25 to 64 years (the population for whom relevant data were available). This inconsistency understated the ratio of lives saved by correcting education-associated excess mortality. Moreover, the causes of death in this age group differ; for example, injuries (accidents, homicide, and suicide) account for 3% of deaths among adults 65 years or older but 12% of deaths among adults 25 to 64 years of age.[55]

Fourth, our calculations assumed the sudden disappearance of disparities; more realistically, death rates among adults with an inadequate education would diminish gradually over time before achieving equity with rates among college graduates. Fifth, we treated medical advances and the elimination of education-associated excess mortality as mutually exclusive enterprises, when in fact one can enhance the other.

The source data underlying our calculations carried their own limitations. For example, mortality rates specific to different levels of educational attainment are affected by the quality of education data reported on death certificates and in census surveys. Decedents who did not graduate from high school are often misclassified as high school graduates on death certificates, inflating death rates among high school graduates and understating death rates among those with less education.[9,10] Educational attainment data are absent from 3% to 9% of death certificates, also causing understated death rates.[8]

Conclusions

Although more reliable data and statistical methods might improve the precision of our projections, the magnitude of the ratio reported here makes it unlikely that the overall direction of our findings would change. The basic notion that more lives would be saved by eliminating education-associated excess mortality than by medical advances is sufficiently robust to justify a change in policy priorities without awaiting further calculations. Our data suggest that correcting the conditions that cause people with inadequate education to die in greater numbers will do far more to save lives than making incremental improvements in the technology of medical care. Society's preoccupation with the latter puts lives at risk. ∎

About the Authors

Steven H. Woolf is with the Departments of Family Medicine, Epidemiology, and Community Health, Virginia Commonwealth University, Richmond. Robert E. Johnson is with the Departments of Biostatistics and Family Medicine, Virginia Commonwealth University, Richmond. Robert L. Phillips, Jr, is with the Robert Graham Center of the American Academy of Family Physicians, Washington, DC. Maike Philipsen is with the Department of Foundations of Education, Virginia Commonwealth University, Richmond.

Requests for reprints should be sent to Steven H. Woolf, MD, MPH, Department of Family Medicine, Virginia Commonwealth University, 1200 E Broad St, PO Box 980251, Richmond, VA 23298-0251 (e-mail: swoolf@vcu.edu).

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Contributors

S.H. Woolf originated the study, performed the initial data analysis, and took primary responsibility for writing the article. R.E. Johnson refined the data analysis and interpretation and assisted in the composition of the article, tables, and figures. R.L. Phillips, Jr, expanded the discussion of policy implications and provided useful references. M. Philipsen examined how the findings would influence educational policy.

Human Participant Protection

No protocol approval was needed for this study.

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